

Water Supply

This chapter describes the quantity and quality of water required, the primary and back-up water supply sources, water quality, and waste water discharges for the Walnut Creek Energy Park (WCEP).

7.1 Water Supply and Use

The Rowland Water District (District) will provide the industrial process water supply for the WCEP from the San Jose Creek Wastewater Reclamation Plant, via a 12-inch reclaimed water supply pipeline that is located in Bixby Drive adjacent to the project site. This pipe will supply tertiary treated reclaimed water to meet cooling and process makeup requirements. Cooling and process demands include water for cooling tower evaporation, drift, and blow down; combustion turbine-generator (CTG) air inlet cooling; CTG wash water; CTG water injection for control of oxides of nitrogen (NO_x) and increased power output. A “will-serve” letter from the District that describes the District’s commitment of reclaimed water supply to the project and to accept sanitary waste water is included in Appendix 7A. One 150,000-gallon tank will be constructed onsite to store reclaimed water.

Water required for potable uses (sinks, toilets, showers, drinking fountains, eye wash/safety showers, plant hose stations, etc.) will be provided from Rowland Water District’s water main in Bixby Drive.

The following water balances show the project’s use of water:

- Base load operation under average ambient conditions (Figure 7.1-1)
- Peak load operation under summer ambient conditions (Figure 7.1-2)

Operation of the WCEP will require approximately 1,460 gallons per minute (gpm) of reclaimed water for operation at under average ambient conditions (62°F dry bulb temperature [DBT]). Under summer ambient conditions (92°F DBT), the WCEP will require approximately 1,528 gpm of reclaimed water for operation at peak load. Peak load operation assumes all CTGs operating at 100 percent load. On an annual average basis, the WCEP is estimated to require, at 100 percent load, approximately 6.75 acre-feet/day of reclaimed water. WCEP potable water demands are estimated to average 3.0 gpm, less than 5 acre-feet per year.

Potable water for consumption and sanitary purposes will be provided through a 4-inch-diameter tap to the water main in Bixby Drive adjacent to the project site.

7.2 Water Quality

Table 7.2-1 describes the quality of the reclaimed water that will be supplied to the project.

TABLE 7.2-1
Summary of Average Water Quality Characteristics for Reclaimed Source Water

Water Quality Parameter	Reclaimed Water (cooling and process supply) ^a	Drinking Water Standard	Secondary Drinking Water Standard
General Parameters			
Alkalinity (as CaCO ₃)	147	no standard (mg/l)	
Hardness (as CaCO ₃)	192	200 mg/l	
Nitrate as NO ₃	19	45 mg/l	
pH	6.9	6.0 – 9.0 units	6.5 – 8.5
Total Dissolved Solids	619	1,500 mg/l	500 mg/l
Total Solids	677		
Turbidity	<2 ntu	1-5 ntu	
Chemical Parameters			
Arsenic	<0.0009	0.05 mg/l ^b	
Boron ^b	0.47	no standard (mg/l)	
Cadmium	<0.0003	0.005 mg/l	
Calcium	48.6	no standard (mg/l)	
Chloride	147	500 mg/l	250 mg/l
Chromium (total)	<0.01	0.05 mg/l (0.1 mg/l)	
Copper (at tap)	<0.006	TT ^c action level 1.3 mg/l	1 mg/l
Fluoride	0.33	2 mg/l	2 mg/l
Iron	0.093	0.30 mg/l	0.3 mg/l
Lead (at tap)	<0.001	TT ^c action level 0.015 mg/l	
Magnesium	17	no standard (mg/l)	
Manganese	0.027	no standard (mg/l)	0.05 mg/l
Mercury (inorganic)	<0.00003	0.002 mg/l	
Nickel	<0.018	no standard (mg/l)	
Potassium	14.6	no standard (mg/l)	
Silver	<0.0002	no standard (mg/l)	0.01 mg/l
Sodium	134	350 mg/l	
Sulfate	127	500 mg/l	250 mg/l
Zinc	0.08	no standard (mg/l)	5 mg/l

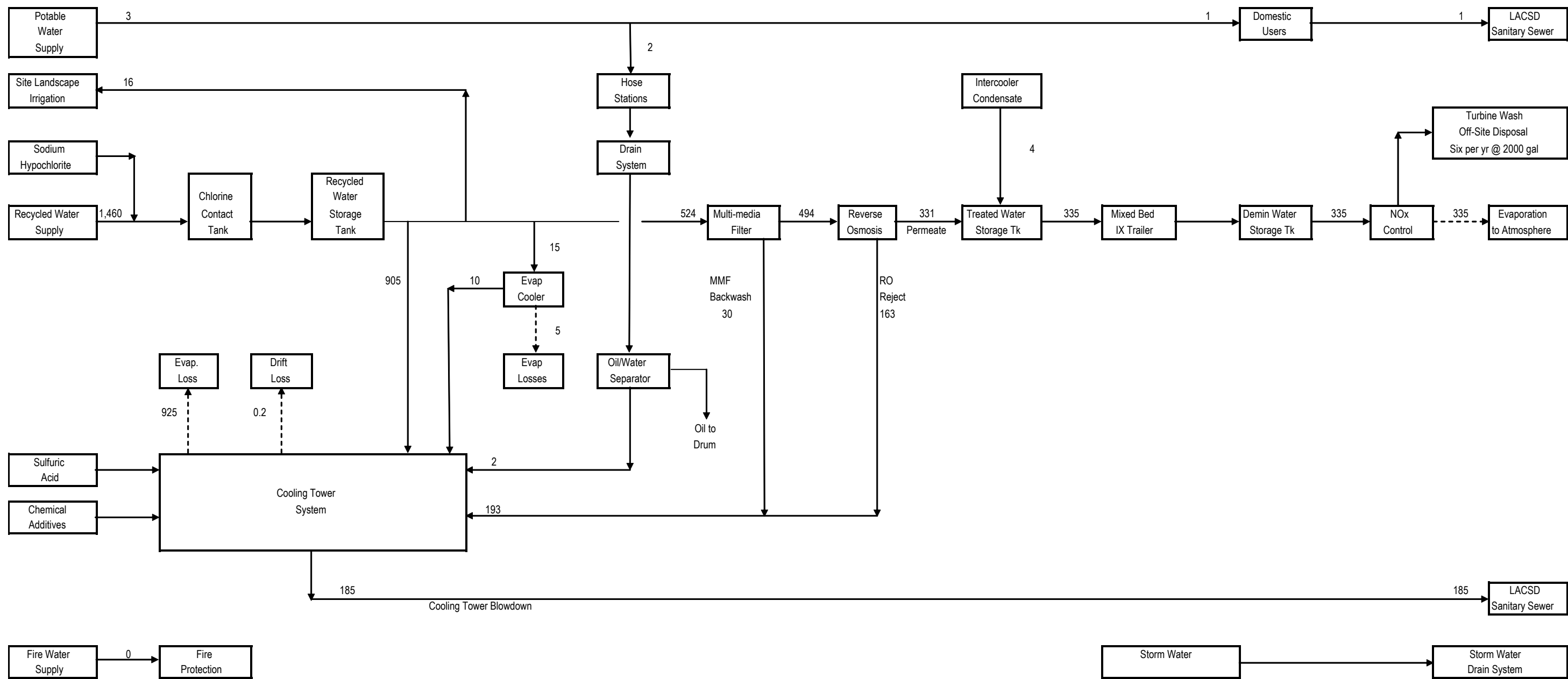
Source: U.S. Environmental Protection Agency. 2004. Drinking Water Standards and Health Advisories. Winter, 2004.

^a Data are from Rowland Water District San Jose Creek Water Reclamation Plant. Units are mg/l unless otherwise indicated.

^b Arsenic standard will change to 0.01 mg/l as of 1/23/06. Boron standard is under review.

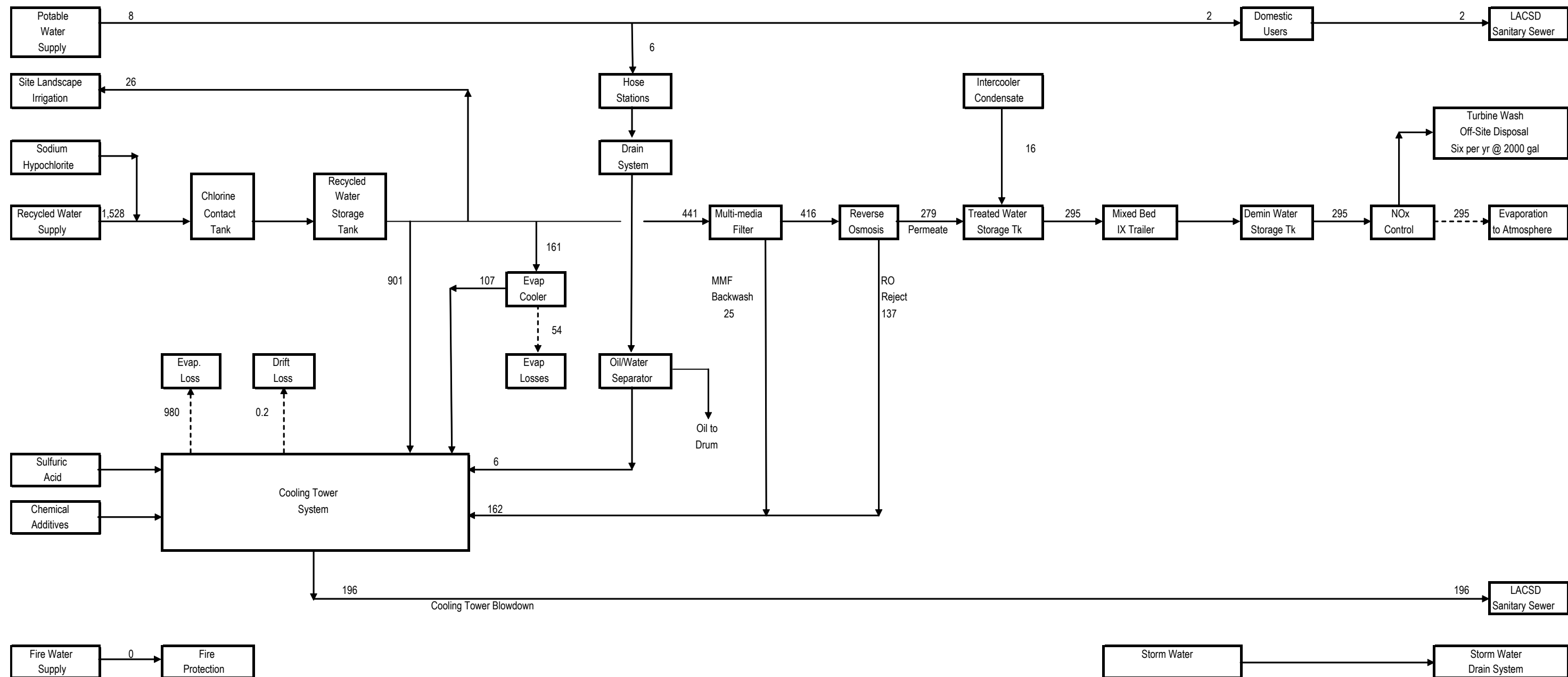
^c TT = Treatment technique indicates that there is a required process to reduce the level of a contaminant in drinking water. The action level for copper is 1.3 mg/l. For lead it is 0.015 mg/l

^d National Secondary Drinking Water Regulations (NSDWRs or secondary standards) are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as undesirable taste, odor, or color) in drinking water.



- Notes:**
1. Numerical values represent steady state flow in gpm
 2. Cooling Tower Blowdown is estimated at normal maximum operating cycles of concentration (6X Recycle Water Supply concentration)
 3. Ambient temperature assumed for this water balance is 62 F DBT/ 56 F WBT.

**FIGURE 7.1-1
PLANT WATER FLOW—ANNUAL
AVERAGE FLOW**
WALNUT CREEK ENERGY PARK
CITY OF INDUSTRY, CALIFORNIA



- Notes:
1. Numerical values represent steady state flow in gpm
 2. Cooling Tower Blowdown is estimated at normal maximum operating cycles of concentration (6X Recycle Water Supply concentration)
 3. Ambient temperature assumed for this water balance is 92 F DBT/69.8 F WBT.

FIGURE 7.1-2
PLANT WATER FLOW—
MAXIMUM DAILY FLOW
 WALNUT CREEK ENERGY PARK
 CITY OF INDUSTRY, CALIFORNIA
CH2MHILL

7.3 Water Treatment

Water treatment will be provided onsite prior to use for water injection. Demineralized water will be used for NO_x injection water. The demineralized water will be produced by a reverse osmosis (RO) and Ion Exchange (IX) system. The demineralized water will be stored in a 100,000-gallon demineralized water storage tank.

Makeup water will be pumped from the reclaimed water storage tank to the cooling tower basins as required to replace water lost from evaporation, drift, and blowdown. A chemical feed system will supply water conditioning chemicals to the circulating water to minimize corrosion and control the formation of mineral scale and biofouling. Sulfuric acid will be fed into the circulating water system in proportion to makeup water flow for alkalinity reduction to control the scaling tendency of the circulating water. The acid feed equipment will consist of a bulk sulfuric acid storage tank and two full-capacity sulfuric acid metering pumps.

To further inhibit scale formation, a polyacrylate solution will be fed into the circulating water system as a sequestering agent in an amount proportional to the circulating water blowdown flow. The scale inhibitor feed equipment will consist of a chemical solution bulk storage tank and two full-capacity scale inhibitor metering pumps.

To prevent biofouling in the circulating water system, sodium hypochlorite will be fed into the system. The hypochlorite feed equipment will consist of a bulk storage tank and two full-capacity hypochlorite metering pumps. A small storage tank, or 100- to 400-gallon totes, and two full-capacity metering pumps will be provided for the feeding of either stabilized bromine or sodium bromide as alternate biocides.

7.4 Waste Water Collection, Treatment, and Disposal

Circulating (or cooling) water system blowdown will consist of reclaimed makeup water and other recovered process wastewater sources that have been concentrated by evaporative losses in the cooling tower, and residues of the chemicals added to the circulating water. These chemicals will control scaling and biological growth in the cooling tower and corrosion of the circulating water piping and condenser tubes. Cooling water treatment will require the addition of a pH control agent (acid), a mineral scale dispersant (that is, polyacrylate polymer), corrosion inhibitors (phosphate based), and biocide (that is, sodium hydroxide or equivalent). The estimated quality of the circulating water is listed in Table 7.4-1. Operating at 6 cycles of concentration times the reclaimed water makeup quality, the volume of blowdown is expected to be about 185 gpm under annual average climatic conditions and about 196 gpm under maximum daily climatic conditions. A portion of this concentrated water will then be removed from the cooling tower via the blowdown to prevent the mineral scale formation on heat transfer surfaces. The non-reclaimable wastewater will be discharged to Section No. 3 of the Los Angeles County Sanitation District (LACSD) No. 21's 48-inch trunk sewer that runs in a utility easement within the WCEP project parcel, adjacent to and parallel with its southern boundary. The Sanitation District is currently processing a permit to accept the waste discharge, but has provided preliminary oral communication that it could and would accept the quantity and quality of wastewater as described in this section.

TABLE 7.4-1
Estimated Recirculating Cooling Water Composition at Maximum Concentration

Water Quality Parameter	Cooling Water Composition at Maximum Concentration
General Parameters	
Alkalinity (as CaCO ₃)	100
Hardness (as CaCO ₃)	1,550.9
Nitrate as NO ₃	153.5
pH	7.6
Total Dissolved Solids	5,000
Total Solids	5,050
Turbidity	<100 ntu
Chemical Parameters	
Arsenic	<0.00727
Boron	3.80
Cadmium	<0.00242
Calcium	392.6
Chloride	1,187.4
Chromium, T	<0.081
Copper	<0.0485
Fluoride	2.67
Iron	0.751
Lead	<0.0081
Magnesium	137.3
Manganese	0.218
Mercury	<0.00024
Nickel	<0.145
Potassium	117.93
Silver	<0.0016
Sodium	1,082.4
Sulfate	2075.8
Zinc	0.6462

* Assumes 8.1 cycles of concentration as a maximum-use scenario. Units are mg/L unless otherwise indicated.

7.4.1 Cooling Tower Drift

Because high efficiency drift eliminators will be used in the cooling towers, the amount of total dissolved solids (TDS) emitted to the atmosphere will be very low. The drift quality is

equivalent to the blowdown quality. The drift volume is typically expressed as a percentage of the circulating water rate (in this case 0.0005 percent of 35,500 gpm, or 0.2 gpm). At 8 cycles of concentration, the TDS in the drift is expected to be approximately 5,000 mg/L. The TDS emitted from the cooling tower in the form of drift is treated as a particulate emission (PM₁₀). At a drift rate of 0.2 gpm, this is equivalent to about 0.44 lb/hr of particulate emissions (see Section 8.1, Air Quality).

7.4.2 Sanitary Waste Water

Sanitary waste water from sinks, toilets, showers and other sanitary facilities will be discharged to Section 3 of LACSD No. 21's 48-inch trunk sewer that runs within the project parcel, via a 6-inch diameter pipeline. The sanitary waste water flow will average about 2.0 gpm (2,880 gpd).

7.4.3 Plant Drainage

Miscellaneous general plant drainage will consist of cleanup, sample drainage, equipment leakage, and drainage from facility containment areas. Water from these areas will be collected in systems of floor drains, sumps, and pipes within the WCEP and discharged to an oil/water separator. The oil-free discharge water will be recycled to the cooling tower basin. An average flow of 2 gpm and a peak flow of 6 gpm are projected. The water will have essentially the same characteristics as the reclaimed water supplied to WCEP. The site plan in Appendix 7B shows plant drainage after construction and indicates how best management practices would be applied for storm water. Plant drainage and storm water discharge permitting is addressed further in Section 8.15, Water Resources. Appendix 7C contains a description of the water calculations used to determine the volume of storm water.

7.5 References

U.S. Environmental Protection Agency. 2004. *Drinking Water Standards and Health Advisories*. Winter.